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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/806,184	06/05/2001	Stephen William Colley	KPT 1092	5402

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EXAMINER

TUCKER, ZACHARY C

ART UNIT	PAPER NUMBER
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1624

17

DATE MAILED: 01/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/806,184

Applicant(s)

COLLEY ET AL.

Examiner

Zachary C. Tucker

Art Unit

1624

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 NOVEMBER 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 March 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All    b) ☐ Some \*    c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 16 and 9.                      6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

This Office action is pursuant to the Request for Continued Examination dated 24 November 2003, and the accompanying amendment to claims 1, 12 and 21, both of which have been entered.

### ***Status of Claim Rejections - 35 USC § 103***

In the previous Office action, dated 16 May 2003, claims 1-29 were finally rejected under 35 U.S.C. 103(a) as being unpatentable over US 2,027,182 (Lazier).

In view of the amendment dated 24 November 2003, the rejection is withdrawn. Claim 1 now requires the intermediate product mixture recovered in (b) to be comprised of the majority of the ethyl acetate produced in (a), selectively hydrogenating a mixture comprised predominantly of ethyl acetate (at least a portion of the liquefiable products produced in (a)), and that in (e), the selectively hydrogenated reaction product mixture recovered in (d) is distilled. Previously, claim 1 specified that "material of" the selectively hydrogenated fraction be distilled, and only required some of the ethyl acetate be subjected to the selective hydrogenation condition. In the broadest reasonable interpretation, the limitations of claim 1 as it was previously presented were met by Lazier's distilling an intermediate reaction mixture produced from dehydrogenation of ethanol to separate most of the ethyl acetate therefrom and then subjecting a distillation residue that contained some residual ethyl acetate to a selective hydrogenation.

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Because Lazier's distillation residue after removal of most of the ethyl acetate, and the distillate, containing most of the ethyl acetate, both contained some materials in common (*i.e.*, the separation is not perfect), the rejection was set forth.

The rejection of claims 1-29 under 35 U.S.C. 103(a) is hereby withdrawn.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-29 are rejected under the judicially created doctrine of double patenting over claims 1, 2 and 11-23 of U. S. Patent No. 6,632,330 B1 (Colley et al) since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent and/or allow for harassment by multiple assignees.

US 6,632,330 B1 and the instant application have in common one inventor and are commonly assigned (applicants' response dated 17 November 2003, page 10, third paragraph).

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows:

Claim 2 (wherein the alkyl alkanoate is produced by either dehydrogenation or reaction with acetaldehyde) of US 6,632,330 B1 specifies a process according to instant claim 1. Ethyl acetate is the preferred alkyl alkanoate in US 6,632,330 B1 (claim 11 of US 6,632,330 B1 and examples therein).

Though claims 11-23 of US 6,632,330 B1 do not depend directly from claim 2 of that patent, it is understood that the process variables specified in claims 11-23 of US 6,632,330 B1 are applicable to claim 2 of US 6,632,330 B1 because claim 2 of US 6,632,330 B1 further limits the manner in which the "impure feedstock containing an alkyl alkanoate" is obtained, so it specifies a process step occurring before what is recited in claim 1 of US 6,632,330 B1.

The "intermediate reaction product mixture" in instant claim 1's step (b) corresponds to the "impure feedstock containing an alkyl alkanoate" recited in step (a) of claim 1 of US 6,632,330 B1.

Though step (d) of claim 1 of US 6,632,330 B1 does not recite the step of recovering the composition comprising ethanol and water, as is specified in (e) of instant claim 1, and also does not recite a step (f) according to instant claim 1 (separating water from the ethanol and water-comprising composition), these additional steps are disclosed in the specification of US 6,632,330 B1 (col. 6, lines 4-16 and col. 7, lines 54-65, col. 9, lines 58-61).

The process variables specified in the dependent claims 11-23 of US 6,632,330 B1 and in the instant application (instant claims 2-29) are substantially overlapping.

The examples of US 6,632,330 B1 disclose all of the process variables such as the ethanol:hydrogen molar ratio, LHSV (also in col. 9, lines 13-16 of US 6,632,330 B1), and catalysts specified in the instantly claimed process.

Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-9 and 11-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2,524,899 (Dunn) or US 2,524,899 (Dunn) in view of US 1,708,460 (Zeisberg).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 2,524,899 (Dunn) in view of "HETEROGENOUS CATALYSTS," products and services, Johnson Matthey Chemmicals, Limited, 1981-1984, page 6 or US 2,524,899 (Dunn) in view of US 1,708,460 (Zeisberg) and further in view of "HETEROGENOUS CATALYSTS," products and services, Johnson Matthey Chemmicals, Limited, 1981-1984, page 6.

At the time the invention was made, the process of claims 1-27 would have been obvious to one of ordinary skill in the art.

Zeisberg discloses a process for manufacturing ethyl acetate from ethanol by vapor-phase dehydrogenation. The Zeisberg process actually involves not only the dehydrogenation of ethanol, but reaction of acetaldehyde with ethanol as well. Acetaldehyde is produced as an intermediate from dehydrogenation of ethanol over a copper catalyst (instant specification, bottom of page 3 to top of page 4), so Zeisberg actually addresses (i) and (ii) in instant claim 1.

Zeisberg exemplifies the process with copper oxide as a catalyst (page 2, line 3) and suggests nickel, cobalt, iron, alone or in admixture with oxides of other metals, such as manganese oxide, chromium oxide, magnesium oxide or calcium oxide as well (page 2, lines 68-80).

Zeisberg teaches that the pressure in the dehydrogenation should be more than 10 atm. (page 2, lines 28-31). Claim 5 of Zeisberg specifies that the dehydrogenation is carried out at a temperature of from 250-500° C. Page 2, lines 7-10 disclose a vapor space velocity of 4/hr during the exemplified dehydrogenation reaction.

Zeisberg does not disclose any particular method of purifying the ethyl acetate produced by the process disclosed in that patent, therefore, the student of Zeisberg, wishing to conduct the process on a large scale, would look to prior art disclosures for such a method.

Dunn discloses a process for purifying an impure ethyl acetate fraction which was produced by reaction of ethanol with acetaldehyde. Dunn's ethyl acetate fraction is

a by-product of butadiene production by reaction of ethanol with acetaldehyde. This ethyl acetate-containing fraction is comprised of about 50-55% ethyl acetate.

The ethyl acetate-containing fraction is produced by first removing the butadiene product, and then washing with water to recover the ethanol and acetaldehyde components. What remains is a "by-product oily layer" comprised of 50-55% ethyl acetate and large amounts of hydrocarbons, substantial amounts of ethyl acetal, methyl ethyl ketone, butyraldehyde, ethanol and water.

Selective hydrogenation of an ethyl acetate-containing mixture ahead of refining to remove close-boiling aldehydes and ketones is old.

The object of the Dunn process is to recover ethyl acetate from the aforementioned "by-product oily layer" in high purity, where this was previously not possible due to the presence close-boiling impurities with the ethyl acetate. These close-boiling impurities are aldehydes and ketones (col. 1, lines 43-55 and col. 2, lines 45-64).

Dunn first distills the "crude by-product oil" to remove hydrocarbons, with the aid of an alcohol (methanol, ethanol or isopropanol) which serves as an azeotroping agent, and then subjects the distillation residue, containing the ethyl acetate, aldehydic and ketonic impurities to a hydrogenation. This hydrogenation is selective by virtue of the fact that only the aldehydes and ketones are reduced, and not ethyl acetate. Dunn's hydrogenation reaction converts the aldehydes and ketones to the corresponding alcohols, which have boiling points higher than ethyl acetate. Thus, the distillation of pure ethyl acetate is achievable after the hydrogenation.



The principal deficiency of Dunn et al with respect to instant claim 1 is that Dunn does not disclose recovery of an ethanol and water-containing fraction subsequent to the distillation of pure ethyl acetate after the hydrogenation step, and then further distilling this fraction to afford an ethanol containing mixture with reduced water content. Doing so, however, is an obvious modification of the Dunn process. Dunn *does* teach that ethanol should be recovered (albeit at a point upstream in the process, from the crude reaction product mixture from the reaction of ethanol and acetaldehyde).

Recovery of a substance employed as a starting material from a point downstream in a production process is an obvious engineering expedient. Ethanol distillation is a well-established technology. Modification of the Dunn process to include recovery of ethanol with reduced water content from the ethyl acetate purification would be *prima facie* obvious to one of ordinary skill, especially given Dunn's teaching that it should be recovered.

Dunn teaches that the hydrogenation may be performed in liquid or vapor phase (as specified in instant claim 2), and provides an example of each (col. 1, lines 43-75 – col. 2, lines 1-4).

Dunn's preferred hydrogenation catalysts are Raney nickel and nickel-chromium on "Aloxite" (col. 4, lines 49 and 73). Dunn suggests platinum, copper chromite, "or other well-known hydrogenation catalyst" as well for the selective hydrogenation. Ruthenium on carbon, as specified in instant claim 10, is a platinum metal-containing catalyst, and a well-known selective hydrogenation catalyst (as demonstrated in "HETEROGENOUS CATALYSTS," products and services, Johnson Matthey

Chemicals, Limited, 1981-1984, page 6, which is cite no. 37 on applicants' 3<sup>rd</sup> Supplemental Information Disclosure statement). Thus, it would have been obvious to employ a ruthenium on carbon catalyst as the hydrogenation catalyst in Dunn's process.

Ethanol:hydrogen ratio, combined partial pressure of ethanol and hydrogen, temperature in the dehydrogenation zone, liquid hourly space velocity in the dehydrogenation zone, reaction mixture:hydrogen molar ratio, combined partial pressure of intermediate reaction products, liquid hourly space velocity in the selective hydrogenation zone, distillation pressures, location of where the liquid draw streams for collecting various fractions from the distillation columns are located and mole % of the various components of the first distillate are parameters known to the skilled chemical engineer to be result-effective variables. Discovering a workable range where the general conditions of a process are disclosed in the prior art is obvious to one of ordinary skill. For example, decreasing LHSV is a means to decrease reaction rate, if that is desired, increasing pressure during a distillation will increase the boiling point of a substance, decreasing the pressure during a distillation will decrease the boiling point, and increasing hydrogen pressure will increase the hydrogenation reaction rate.

One of ordinary skill would be motivated by myriad factors to vary any number of process parameters. These could include factors such as the tolerances of the equipment being employed, amount of impurities in the starting materials, amount of and type of catalyst employed, extreme weather conditions (if the installation is outdoors), and time constraints.

If applicant can demonstrate that any of the numerous specified ranges for a process variable in the dependent claims, said process variable *not* disclosed in either Zeisberg or Dunn, provide for an unexpected result, then a process wherein those variables are specified would be allowable.

***Information Disclosure Statement***

As requested in the correspondence from applicants dated 17 November 2003, the examiner has considered the items numbered 13 (JP 59-25334), 14 (SU 362814), 18 (JP 5-186392), and 21 (the abstract of Brazilian Application no. PI 9104652A).

These references have been considered solely to the extent they are characterized in the specification.

***Conclusion***

Any inquiry concerning this communication should be directed to Zachary Tucker whose telephone number is (703) 305-2050. The examiner can normally be reached Monday-Friday from 7:00am to 3:30pm. If Attempts to reach the examiner are unsuccessful, the examiner's supervisor, Mukund Shah, can be reached at (703) 308-4716. The fax number for the organization where this application or proceeding is assigned is (703) 308-4556 for regular communications and (703) 308-4242 for after-final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1235.

zt



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